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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10 000,370	12 04 2001	Toshio Ueta	10636-009	9750

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EXAMINER

PEREZ, GUILLERMO

ART UNIT

PAPER NUMBER

2834

DATE MAILED: 05 07 2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/000,370

Applicant(s)

UETA ET AL.

Examiner

Guillermo Perez

Art Unit

2834

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-4, and 6-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Trumper et al. (U. S. Pat. 6,003,230).

Referring to claim 1, Trumper et al. disclose a planar motor comprising:

a coil array (20,22) having a plurality of coils, each coil is fixed in position with respect to the other coils;

a magnet array (16,18) having a plurality of magnets, each magnet is fixed in position with respect to the other magnets, the magnet array (16,18) being movable above the coil array (20,22) in at least two degrees of translational freedom and at least one degree of rotational freedom (column 3, lines 50-67); and

a model-based predictive torque controller (column 5, lines 28-40) comprising a current switching model, the torque controller configured to provide current to energize each coil in response to the position of each magnet with respect to a coil; in which

the torque controller provides currents to the coil array to at least substantially reduce force ripple during movement of the magnet array (column 3, lines 50-67 and column 4, line 56 through column 5, line 27).

Referring to claim 2, Trumper et al. disclose that the torque controller simultaneously stabilizes translational and rotational movement (column 3, lines 50-67).

Referring to claim 3, Trumper et al. disclose that that the torque controller compensates for torque produced by translation (column 3, lines 50-67).

Referring to claim 4, Trumper et al. disclose that the coil array is square (figure 3).

Referring to claim 6, Trumper et al. disclose a method for controlling a planar motor for movement in three degrees of freedom, the method comprising:

positioning a movable magnet array (16,18) over a fixed coil array (20,22), the coil array (20,22) having coils generally disposed in a plane defining first and second directions that are substantially orthogonal to one another, and the magnet array (16,18) having magnets with magnetic fields;

applying currents to the coils following a current switching model to control movement of the magnet array and substantially reduce force ripple during the movement (column 3, lines 50-67 and column 4, line 56 through column 5, line 27).

Referring to claim 7, Trumper et al. disclose determining a first translational force for the magnet array in the first direction and a second translational force for the magnet array in the second direction (column 5, lines 1-9).

Referring to claim 8, Trumper et al. disclose determining a torque for the magnet array in a third direction perpendicular to the first and second directions (column 5, lines 1-9).

Referring to claim 9, Trumper et al. disclose a planar motor comprising:

magnet array means (16,18);

coil array means (20,22); and

control means providing electric current to the coil array means for controlled movement of the magnet array means in three degrees of freedom including current switching means for at least substantially reducing force ripple during movement of the magnet array.

Referring to claim 10, Trumper et al. disclose a stage system comprising a planar motor, the planar motor comprising:

a coil array having a plurality of coils, each coil fixed in position with respect to the other coils;

a magnet array having a plurality of magnets, each magnet fixed in position with respect to the other magnets, the magnet array being movable above the coil array in at least two degrees of translational freedom and at least one degree of rotational freedom; and

a model-based predictive torque controller comprising a current switching model, the torque controller configured to provide current to energize each coil in response to the position of each magnet with respect to a coil; in which

the torque controller provides currents to the coil array to at least substantially reduce force ripple during movement of the magnet array.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 5, and 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hazelton (U. S. Pat. 6,097,114) in view of Trumper et al.

Hazelton discloses a device (semiconductor) manufactured with an exposure apparatus comprising an illumination system (1314) that supplies radiant energy and a stage system (1330) comprising a planar motor, the planar motor comprising:

- a coil array having 25 coils (figure 10B), each coil fixed in position with respect to the other coils;

- a magnet array (Figure 10A) having a plurality of magnets, each magnet fixed in position with respect to the other magnets, the magnet array being movable above the coil array in at least two degrees of translational freedom and at least one degree of rotational freedom; and

- a torque controller; in which

- the torque controller provides currents to the coil array, in which the stage system carries at least one object disposed on a path of the radiant energy.

Hazelton discloses a wafer comprising an image, in which the image is formed with an exposure apparatus comprising an illumination system that supplies radiant energy and a stage system comprising a planar motor, the planar motor comprising:

- a coil array having a plurality of coils, each coil fixed in position with respect to the other coils;

a magnet array having a plurality of magnets, each magnet fixed in position with respect to the other magnets, the magnet array being movable above the coil array in at least two degrees of translational freedom and at least one degree of rotational freedom; and

a torque controller; in which

the torque controller provides currents to the coil array, and in which the stage system carries at least one object disposed on a path of the radiant energy.

However, Hazelton does not disclose that the torque controller is model-based. Hazelton does not disclose that the predictive torque controller comprises a current switching model. Hazelton does not disclose that the torque controller is configured to provide current to energize each coil in response to the position of each magnet with respect to a coil to at least substantially reduce force ripple during movement of the magnet array.

Trumper et al. disclose that the torque controller is model-based (column 3, lines 50-67 and column 4, line 56 through column 5, line 27). Trumper et al. disclose that the predictive torque controller comprises a current switching model. Trumper et al. disclose that the torque controller is configured to provide current to energize each coil in response to the position of each magnet with respect to a coil to at least substantially reduce force ripple during movement of the magnet array. The invention of Trumper et al. has the purpose of controlling the three degrees of movement of the stage.

It would have been obvious at the time the invention was made to modify the exposure apparatus of Hazelton and provide it with the torque controller disclosed by

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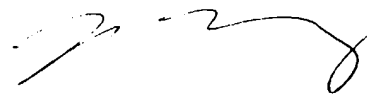
Trumper et al. for the purpose of controlling the three degrees of movement of the stage.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Guillermo Perez whose telephone number is (703) 306-5443. The examiner can normally be reached on Monday through Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nestor Ramirez can be reached on (703) 308 1371. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305 3432 for regular communications and (703) 305 3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308 0956.



Guillermo Perez  
Tuesday, April 22, 2003